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10/599,880	02/19/2007	Willibald Dafinger	WAS0813PUSA	5961

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EXAMINER

CUTLIFF, YATE KAI RENE

ART UNIT	PAPER NUMBER
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1621

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/599,880	Applicant(s) DAFINGER ET AL.	
	Examiner YATE' K. CUTLIFF	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6 - 16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6 - 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on october 12, 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 6-16 are pending.

Claims 1-5 have been canceled

Claims 6-16 are rejected.

Response to Amendment

2. The amendment to claims 6, 12, 13, 15 and 16, submitted March 5, 2009 is acknowledged and entered.

Response to Arguments

3. Applicant's arguments, see page 7, filed March 5, 2009, with respect to the 35 U.S.C. 112 second paragraph rejections of claims 6, 12 and 16 have been fully considered and are persuasive in view of the amendments. The 112 second paragraph rejection of claim 6, 12 and 16 has been withdrawn.
4. Applicant's arguments, see pages 7 - 15, filed March 5, 2009, with respect to the rejection(s) of claim(s) 6-16 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Williams et al. (EP 0985657 A1), Zeyss (WO 01/90042), Roscher et al. (US 4,818,347), Calcagno et al. (US 3,862,216) and Broz (US 3,904,656), as set out below.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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6. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. The previous rejection of claim 15 is maintained. Also, claim 15 as amended to, is rejected because, it unclear in which step of the process will the reactor be purged of inerts.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 6 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Williams et al. (EP 0985657 A1), in view of Zeyss (WO 01/90042), in view of Roscher et al. (US 4,818,347), in view of Calcagno et al. (US 3,3862,216) and further in view of Broz (US 3,904,656).

12. The rejected claims cover, inter alia, a process for ethylene recovery in a recirculating gas process for preparing vinyl acetate. Independent claims 6, 12 and 13 include steps a) to f), where in step d) the product gas stream is fed from the reactor at system pressure directly to a recycle gas scrubber charged with acetic acid, and vinyl acetate is removed to form a vinyl acetate-free recycle gas. Rejected claims 7 and 8 disclose uses for the ethylenic gas recovered from the process of claim 6. Rejected claims 9-11 further disclose the reaction conditions.

13. The process of claim 12 sets out the composition of product gas stream after separation in step b). Rejected claim 14 sets out the content of the ethylene recycle stream after carbon dioxide removal. Dependent claim 15 discloses the amount of ethylene loss by inert gas purge. Dependent claim 16 identifies the percentage of recycle gas going to production of acetic acid.

14. The process of claim 13 sets out the composition of product gas stream after removal of carbon dioxide in step e).

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15. Williams et al. discloses a process for preparing vinyl acetate by reacting ethylene, acetic acid and oxygen in the presence of a Pd/Au support catalyst; and recovers unreacted ethylene gas from the vinyl acetate reaction process. The vinyl acetate reaction process is carried out above atmospheric pressure, (0.5 barg to 20 barg) and at temperatures ranging from 100°C to 400°C. (see page 2, lines 43 - 56 & page 4, lines 43-44). Williams et al. operates at high ethylene concentrations and seeks to reduce the amounts of inerts in the recycle gas because it increases the loss of ethylene. However, the numerous methods for reducing/minimizing/eliminating inerts in the ethylene recycle is an indication that Williams et al. recognizes that there is a likelihood that inerts will consistently remain in the ethylene even after a treatment to remove carbon dioxide and inerts. The inerts of Williams et al. can be nitrogen, argon, methane, or ethane. Further, Williams suggest that one of the ten methods described in [0028] can be used to reduce the carbon dioxide and other inert gases. Additionally, unreacted ethylene is recovered from the gases withdrawn from the reactor by the steps of (i) separating condensable products from the gases by condensation and (ii) treating the gases from step (i) to recover ethylene, ... by chemical treatment. The gases separated from the condensable products of step (i) contain residual vinyl acetate which can be removed with acetic acid in a scrubber. (see [0033] & [0034]). Carbon dioxide is removed from ethylene by an absorption process, i.e. Benfield system. Furthermore, Williams et al., in Figure 5 shows that selectivity of the process becomes increasingly selective toward the production of vinyl acetate as the concentration of ethylene is

increased beyond 60%. Additionally, Williams et al., in Figure 3 shows that an increase in ethylene concentration decreases the rate of carbon dioxide production.

The difference between Williams et al. and Applicants claimed process is the following: scrubbing the product gas stream at the system pressure in a recycle gas scrubber charged with acetic acid; other uses for the recovered ethylene; the percentage of composition mixture of the product gas stream; and the percentage of ethylene loss in the purge gas.

However, Zeyss discloses a process for the production of vinyl acetate from ethylene, acetic acid and oxygen where the ethylene and the acetic acid are the product of the reaction of ethane and molecular oxygen. (see page 2, para. 6). Vinyl acetate production occurs in step (b) of Zeyss. (see page 7). Process step (b) produces a second process stream that contains unreacted acetic acid, ethylene, ethane, nitrogen, carbon monoxide, carbon dioxide and possible other byproducts. Intermediate between step (b) and (c) is a scrubbing column for the removal of ethylene, ethane, carbon monoxide and carbon dioxide, and where the vinyl acetate, water and acetic acid are removed therefrom. (see page 8 para. 2). Also, the second product stream from step (b) can be separated with or without the intermediate scrubbing step. (see page 8 para. 3). Zeyss states that the overall product yield may be adjusted in a number of ways including independently adjusting the reactant ratios and/or reaction conditions of step (a) or step (b) of the process. (see page 8 para. 6). According the process of Zeyss: "A product stream comprising vinyl acetate, water, optionally ethane, gaseous by-products and unreacted acetic acid and ethylene is withdrawn from the second reaction

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zone (2) and is fed to the scrubber column (3) where a gaseous stream comprising ethylene, and optionally ethane together with inerts, carbon monoxide and carbon dioxide by-products is withdrawn overhead and is recycled to the first reaction zone (1). A liquid stream comprising vinyl acetate, water, unreacted acetic acid and possibly present high boiling products of the process are withdrawn from the base of the scrubber column (3) and vinyl acetate is isolated in state of the art equipment not shown. For example it is fed to a distillation column where vinyl acetate and water is removed as an azeotrope and acetic acid, and the possibly present high boiling products are removed as a bleed from the base of the distillation column.” The carbon dioxide may be removed by known absorption methods. (page 9 para. 2 and 3). From the teaching of Zeyss one skilled in the art would recognize that the product gas stream from step (b) can be fed directly to the scrubbing column at system pressure from the reactor of step (b); because the unreacted acetic acid and ethylene is withdrawn from the second reaction zone (2) and fed directly to the scrubber. Further, there is no discussion in Zeyss that there is a decrease in pressure when unreacted acetic acid and ethylene is withdrawn from the second reaction zone (2) is fed to the scrubbing column from the second reaction zone (2).

The difference between Zeyss and the claimed process is that Zeyss does not state that acetic acid is used in their scrubber column receiving the product stream that is withdrawn from the second reaction zone (2).

However, in the absence Zeyss' not teaching what is used in their scrubber, one skilled in the art with knowledge of Williams would recognize that acetic acid could be

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used in the scrubber. This is because it removed residual vinyl acetate from the gases drawn from the reaction system of Williams. Also, Roscher et al. would support the use of acetic acid in the scrubber to remove vinyl acetate. Roscher et al. teaches a process for the isolation of vinyl acetate from a gas mixture formed in the reaction of ethylene with acetic acid and oxygen in the gas phase over catalysts containing palladium or palladium compounds, i.e. step (e) (see column 3, lines 39-68 & column 4, lines 1-21).

It would have been obvious to one of ordinary skill in the art to, at the time of the present invention was made, to have modified the teaching of Williams by subjecting the product stream gas from the reaction of ethylene, acetic acid and oxygen, in a gas scrubber charged with acetic acid prior to the removal of the condensable products as suggested by Zeyss with a reasonable expectation of success; because it is known in the art that acetic acid will remove the residual vinyl acetate from the product stream after a condensation step like the ones taught by Williams and Roscher. From the teachings of the references it appears that Applicant is merely changing the order of performing the process steps. Selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. (In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)).

Further, the core step of Applicant's process as set out claims 6, 12 and 13 is step d), which state; "the product gas stream is fed at system pressure to a recycle gas scrubber charged with acetic acid to remove the vinyl acetate"; is a change in the standard sequence according to the teachings of Williams and Roscher et al., which use scrubbing to remove residual vinyl acetate not condensed out. However, Zeyss

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discloses that scrubbing of the gas can occur before or after the condensable products are removed from the product stream gas.

Thus, modifying the process of Williams is prima facie obvious because an ordinary artisan would be motivated to use known methodology for the existing process to make the process more efficient or explore economical advantages over the other, since it is within the scope to optimize the conditions through routine experimentation.

16. With regard to other uses for the recovered ethylene and the percentage discharged from other use Calcagno et al. teaches a process for the production of vinyl acetate by catalytic oxidation of ethylene in the presence of acetic acid; where a fraction of the recycled gases are withdrawn from the reactor where the vinyl acetate is formed and the ethylene contained in the fraction is catalytically oxidized to acetic acid. (see column 1, lines 31-48). Calcagno et al., even though it is teaching a different process states that it is customary in the prior art to remove the by products from the recycle gases, which contain mostly ethylene, by known purification processes. (see column 1, lines 20-28). As such if the ethylene of the recycle gas is purified it becomes useful for any other industrial process that uses ethylene in their production process, such as the one set out in Broz where various ethylene glycols are produced. (see column 1, lines 5-11). The percentage chosen to send to other process appears to operator choice and well within the purview of one skilled in the art. Thus, this limitation is deemed to be obvious absent a showing of unexpected results.

A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill in the art might reasonably infer from the teachings. (*In*

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reOpprecht 12 USPQ 2d 1235, 1236 (Fed Cir. 1989); *In re Bode* 193 USPQ 12 (CCPA) 1976). In light of the forgoing discussion, the Examiner concludes that the subject matter defined by the instant claims would have been obvious within the meaning of 35USC 103(a). From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

17. With regard to the weight percentage of the composition mixture of the product gas stream, Williams discloses that when the recovered ethylene is introduced into the reactor at the step for vinyl acetate production at least the composition is at least 60%. (see page 2, line 52). Additionally, none of the remaining references fully discloses each of the claimed weight percentages for the product gas stream after scrubbing, or after scrubbing and carbon dioxide removal. However, the prior art references of Williams et al., Zeyss and Roscher et al. each disclose that the gaseous product mixture from the vinyl acetate production process contains largely unreacted ethylene, along with by-products such as, carbon dioxide, argon, nitrogen, oxygen, methane and/or ethane. Therefore, these weight percentages are deemed to be within the purview of an ordinary artisan; and are deemed to be obvious absent a showing of unexpected results.

18. With regard to the percentage of ethylene loss via purge of the inerts this appears to be obtained by routine experimentation in light of the teachings of Williams

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et al. and Zeyss. Williams discloses that vent purging is a routine method for removing inert gases; and reducing the amount of inert gas in the system reduces the amount of purge gas that has to be vented thus reduces the ethylene loss. Zeyss states that product yield can be adjusted. Adjusting the reaction process to control the overall product yield would ultimately affects the amount of inert gases produced. Thus, this limitation is deemed to be obvious absent a showing of unexpected results.

A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill in the art might reasonably infer from the teachings. (*In re Opprecht* 12 USPQ 2d 1235, 1236 (Fed Cir. 1989); *In re Bode* 193 USPQ 12 (CCPA) 1976). In light of the forgoing discussion, the Examiner concludes that the subject matter defined by the instant claims would have been obvious within the meaning of 35USC 103(a). From the teachings of the references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE' K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel M. Sullivan can be reached on (571) 272 - 0779. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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